

**U.S. HOUSE OF REPRESENTATIVES  
COMMITTEE ON SCIENCE**

**HEARING CHARTER**

*An Overview of the Federal R&D Budget for Fiscal Year 2007*

**Wednesday, February 15, 2006**

**10:00 a.m. - 1:00 p.m.**

**2318 Rayburn House Office Building**

**1. Purpose**

On Wednesday, February 15, 2006, the House Science Committee will hold a hearing to consider President Bush's fiscal year 2007 (FY07) budget request for research and development (R&D). Five Administration witnesses will review the proposed budget in the context of the President's overall priorities in science and technology. The Science Committee will hold a separate hearing on February 16<sup>th</sup> to examine the budget request for the National Aeronautics and Space Administration (NASA).

**2. Witnesses**

**Dr. John H. Marburger III** is Director of the Office of Science and Technology Policy (OSTP), the White House science office. Prior to joining OSTP, Dr. Marburger served as President of the State University of New York at Stony Brook and as Director of the Brookhaven National Laboratory.

**Dr. Samuel W. Bodman** is the Secretary of the Department of Energy (DOE). Prior to joining DOE, Dr. Bodman served as Deputy Secretary of the Treasury and Deputy Secretary of the Department of Commerce (DOC). He also served in executive positions in several publicly owned corporations and as a professor of chemical engineering at the Massachusetts Institute of Technology.

**Dr. David A. Sampson** is the Deputy Secretary of the Department of Commerce, which includes the National Institute of Standards and Technology (NIST) and the National Oceanic and Atmospheric Administration (NOAA). Previously, Dr. Sampson served as Assistant Secretary of Commerce for Economic Development and head of the Economic Development Administration.

**Dr. Arden L. Bement** is the Director of the National Science Foundation (NSF). Prior to his appointment to NSF, Dr. Bement was Director of NIST and professor and head of the School of Nuclear Engineering at Purdue University.

**Dr. Charles E. McQueary** is the Under Secretary for Science and Technology (S&T) at the Department of Homeland Security (DHS). Prior to joining the Department, Dr. McQueary served as President of General Dynamics Advanced Technology Systems, as President and Vice

President of business units for AT&T, Lucent Technologies, and as a Director for AT&T Bell Laboratories.

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### 4. Background

#### *Overall Budget*

Under the President’s proposed budget for FY07, overall discretionary spending would increase by 3.2 percent, which the Administration describes as a level just under the projected rate of inflation of 3.3 percent. Consistent with Administration priorities, the increases are heavily weighted toward spending on defense and homeland security. Discretionary spending, excluding defense spending and homeland security spending across the government (i.e., “non-security spending”) would be reduced by 0.5 percent, according to the Administration’s calculations.

#### *Snapshot of Research and Development (R&D) Spending*

There are many ways of describing the R&D budget (see below), depending on what one wants to emphasize or determine. For example, development can be excluded or included; defense and homeland spending can be excluded or included; an entire agency’s budget can be included or only those parts directly related to research and/or development. In addition, different baselines can be used for FY06. For example, supplemental funding can be excluded or included; Congressional earmarks can be excluded or included. In this charter, the FY06 enacted levels are used as the baseline unless otherwise noted.

The President’s proposed FY07 budget does not treat R&D uniformly, but rather provides significant increases in priority areas, while reducing or freezing spending in other areas. Therefore, aggregate numbers mask the wide variation in individual agencies and programs. The budget provides large percentage increases for the three physical science agencies included in the *American Competitiveness Initiative* the President announced in the State of the Union message – research funding at the National Science Foundation (NSF), internal programs at the National Institute of Standards and Technology (NIST) and the Office of Science at the Department of Energy (DOE). In keeping with the *Advanced Energy Initiative*, also unveiled in the State of the Union address, some of the energy supply research programs of DOE also receive significant boosts (detailed below). And the basic research programs of DOD, which fund a great deal of

university research in the physical sciences, also appear to fare well if earmarks are removed from the FY06 base.

The budgets for other R&D agencies reflect their lower priority. Most notably, the National Aeronautics and Space Administration (NASA), after two years of significant increases, would see its budget increase by 1 percent (or by 3.2 percent if emergency money to recover from Hurricane Katrina is excluded from the FY06 base). The budget for the National Institutes of Health (NIH), which had seen its budget double in the years leading up to FY06, would be frozen. These proposals damp down the aggregate numbers for research spending since they are larger than the agencies receiving increases. (The proposed budgets for the three agencies in the *American Competitiveness Initiative* total about \$10.5 billion, while NASA alone is slated to receive close to \$17 billion and NIH is budgeted at more than \$28 billion.)

### *Federal Research and Development Budget*

The President's budget proposes to spend \$137.2 billion on R&D in FY07, an increase of \$3.4 billion, or 2.6 percent, over FY06.<sup>1</sup> Non-security R&D funding grows by \$1.1 billion or 1.8 percent. Funding is heavily weighted toward development, which would increase by \$4.88 billion, or 7 percent).<sup>2</sup> Basic research is up slightly (\$357 million, or 1 percent) and applied research is cut significantly (\$1.83 billion, or 7 percent).

### *Federal Science and Technology Budget*

The Federal Science and Technology (FS&T) budget, is a method the National Academy of Sciences recommended to evaluate the impact of the budget on true research (as opposed to large development projects that build on the results of research that has already been completed). In the FY07 budget proposal, funding for FS&T declines by 1 percent, or \$594 million, to \$59.8 billion. Many of the cuts that contribute to that number reflect the Administration's zeroing out of FY06 earmarks. Earmarking has been increasing rapidly in recent years, and some of the earmarks are for projects that are entirely unrelated to the work of the program being earmarked.

### *American Competitiveness Initiative*

The *American Competitiveness Initiative* calls for doubling the combined (not necessarily the individual) budgets of NSF, NIST and the DOE Office of Science over the next 10 years, and the FY07 budget proposals represent the downpayment to begin that process.

In addition to those funding increases, the Initiative includes education and tax programs. The President's budget request proposes \$380 million for new programs at the Department of Education to improve science, technology, engineering, and math (STEM) education at the K-12 levels. Specifically, the programs are designed to enable more teachers to teach Advanced Placement courses, to bring math and science professionals into the classroom to evaluate approaches to teaching math and science, and to improve math instruction at the elementary and

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<sup>1</sup> A complete federal R&D spending table is provided at the end of the charter in Appendix II.

<sup>2</sup> Defense development is by far the largest factor in the overall R&D increase, accounting for \$3.1 billion in added spending.

middle school levels. Despite the Initiative, the overall discretionary budget for the Department of Education drops by about \$2 billion in the President's budget.

Finally, as part of the *American Competitiveness Initiative*, the President has also proposed making the R&D tax credit permanent and working with Congress to modernize the rules companies may use to calculate how much of their R&D spending is eligible for the tax credit. At a cost of about \$86 billion over 10 years, the tax credit is by far the most expensive aspect of the Initiative.

### *Earmarking*

The American Association for the Advancement of Science (AAAS) has calculated that Congressional earmarks in R&D programs totaled \$2.36 billion in the FY06 appropriations.<sup>3</sup> This is 13 percent higher than in FY05 and 63 percent higher than in FY03. The Administration removes earmarks from an agency's base funding before developing the next year's budget. (The Administration does not necessarily use the same definition of earmark as does AAAS, and the Administration sometimes classifies as "earmarks" whole programs created by Congress, even if they are truly open to all qualified parties.) Moreover, earmarks can be for activities that an agency would otherwise undertake but not necessarily at the earmarked location, for activities related to an agency's programs, or for activities with little connection to an agency's activities. NIST's construction account, for example, has been earmarked for projects that have no relationship whatsoever to that laboratory.

## **5. Primary Issues**

Here are some key questions raised by the FY07 budget request along with relevant background:

### *Overall Funding Levels and Balance*

The *American Competitiveness Initiative* reflects the calls from leaders in industry and higher education to increase spending for physical science research, which has lagged for years behind the bounding growth for biomedical research. Most notably, the report the National Academy of Sciences released last November, *Rising Above the Gathering Storm*, recommended increasing federal funding for long-term basic research for 10 percent a year for seven years, with emphasis on the physical sciences, including in the basic research programs of DOD, and other reports have made similar recommendations.

The issues raised by the overall approach to R&D funding are:

- 1) **Does the budget set the appropriate priorities for R&D funding and fund them adequately?** The budget does provide additional funding for the physical sciences, far in excess of the overall growth in the budget. However, some critics note that the funding increases are less than those called for in various reports and are below the levels

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<sup>3</sup> Note that the \$2.36 billion underestimates the total impact of earmarking on science agencies and programs, as it does not include earmarking of research accounts to pay for non-R&D expenditures. AAAS analysis of earmarks is available at <http://www.aaas.org/spp/rd/earm06c.htm>.

authorized in laws that originated in the Science Committee, such as the *National Science Foundation Authorization Act of 2002* and the *Energy Policy Act of 2005*.

2) **Does the budget provide adequate funding for agencies not considered a priority?**

The greatest budget disputes are likely to revolve around funding for NIH and other agencies that do not receive increases. As noted earlier, most of those agencies have increased more rapidly in recent years.

3) **Will the proposed investments ensure future U.S. competitiveness?** Critics of increased spending may argue that holding the line on more spending and focusing on regulatory or other changes would have a greater impact on U.S. ability to fend off international competition. Supporters of the spending increases have varying ideas on how to target the funding (in terms of scientific disciplines, areas of technology, and the riskiness of research) to get the best results. Ideas about targeting could be part of future authorizing legislation. For example, many reports recommend that some research funds should be set aside for riskier, more cross-disciplinary research that may not be selected through normal peer review processes.

### *Applied Energy Research*

Funding for applied research in the FY07 budget is focused on long-range initiatives, such as the President's hydrogen initiative, while shorter payoff areas of research are de-emphasized. For example, energy efficiency R&D is slated to decline by 11 percent, and some deployment programs are eliminated. **Does the budget appropriately balance funding for technologies that could reduce energy dependence in the near term with research on technologies with longer-term expected payoffs, such as hydrogen and fusion?** The budget includes a proposal to promote nuclear energy worldwide called the Global Nuclear Energy Partnership. Included in this effort are design efforts for three new projects. These projects would require large outyear funding, in addition to existing outyear funding commitments to the Next Generation Nuclear Plant. **Given the future budget outlook, how will DOE manage these large outyear funding commitments?** The budget also proposes the elimination of DOE's oil and gas R&D, and to repeal the mandatory funding authority for the Ultra-Deepwater and Unconventional Natural Gas program created by the *Energy Policy Act of 2005*. **Should these programs be eliminated?**

### *NSF Education Funding*

The FY07 budget increases the Education and Human Resources (EHR) Directorate at NSF by 2.5 percent to \$816 million. While this is a significant improvement over the FY06 request of \$737 million, it is still below the FY04 level of \$938 million. Within the proposal, elementary, secondary and undergraduate education programs are reduced, while graduate education and human resource development programs are increased. No money for new grants is proposed for the Math and Science Partnership Program, which the Administration seeks to phase out at NSF, while preserving the program at the Department of Education. **Is the funding for NSF education programs adequate, and what is NSF's role in science and math education compared to that of the Department of Education?**

## *Technology Programs at NIST*

While the internal programs of NIST receive healthy increases in the President's budget, the budget proposes again to eliminate the Advanced Technology Program (ATP), which funds research at private firms, and to halve the budget for the Manufacturing Extension Partnership program (MEP), which runs centers across the country to counsel smaller companies. Both programs were created by Congress in 1988. MEP centers generally receive one-third of their funding from the federal government, with the remainder equally divided between states and fees charged to companies that use the centers. **Should ATP be eliminated? Can MEP function effectively with sharply reduced federal funding? How high a priority are they compared to other government activities designed to promote applied technology development and U.S. manufacturing competitiveness?**

### **6. Interagency Research Activities**

Budget tables for select interagency programs are provided in Appendix I. The Administration has not proposed any new interagency R&D initiatives for FY07.

**National Nanotechnology Initiative (NNI):** Between FY01 and FY06, spending on federal nanotechnology R&D has nearly tripled, rising from \$464 million in FY01 to \$1.3 billion in FY06. The FY07 budget requests an estimated \$1.28 billion for the program in FY07, a decrease of \$24 million, or 1.8 percent, from the estimated FY06 level.<sup>4</sup> Requested funding for the five agencies<sup>5</sup> authorized in the *21st Century Nanotechnology Research and Development Act* (P.L. 108-153) is \$751 million, a 10.1 percent increase over the FY06 level, but below the \$955 million authorized for these agencies for FY07 in the Act. Of particular note is the proposed near doubling of funding, from \$5 million to \$9 million, for EPA to work on potential environmental and safety issues associated with nanotechnology. The Committee held a hearing in the fall at which both industry and environmental groups called for increased research on the potential environmental consequences of nanotechnology.

**Networking and Information Technology R&D (NITRD):** NITRD is an interagency program coordinating information technology (IT) R&D across twelve agencies. Areas of emphasis include high-end computing systems and software, networking, software design, and human-computer interaction. In addition, for the first time in FY07, cybersecurity and information assurance research activities will be included in the interagency coordination effort. Information technology research has played a critical role in U.S. economic strength over the past several decades, and consistent with the President's prioritization of areas that impact U.S. competitiveness, the budget request recommends \$3.07 billion for NITRD programs in FY07, a 7.7 percent increase over FY06. A significant part of that increase is designated for expanded work on high-performance computing at NSF, the DOE Office of Science, and NOAA.

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<sup>4</sup> The Administration notes that the FY06 NNI funding includes over \$100 million in earmarks at DOD and over \$10 million in earmarks at NASA. When those are removed, the request for NNI is for an increase of 7.2 percent.

<sup>5</sup> The five agencies authorized by the Act are: NSF, DOE, NASA, EPA, and NIST. The total funding authorized by the Act for these agencies is \$3.7 billion over four years.

**Cybersecurity R&D:** Significant increases are requested for cybersecurity R&D programs in FY07 at NSF, NIST, and DHS. While funding for cybersecurity activities at NSF and NIST is still below the levels authorized in the *Cyber Security Research and Development Act* (P.L. 107-305),<sup>6</sup> both agencies have directed considerable portions of their overall increases to their cybersecurity research programs. At NSF, the budget requests \$94 million for cybersecurity R&D (up 27 percent), and keeps cybersecurity-focused education programs flat at \$14 million. At NIST, the request is \$21 million for cybersecurity R&D (up 11 percent from FY06). Within a flat budget at the DHS Science and Technology (S&T) Directorate, the cybersecurity R&D program was one of a very few programs in which funding is requested to start new projects in FY07; the budget proposes \$24.9 million for cybersecurity R&D, up 50 percent from the FY06 level.<sup>7</sup>

**Climate Change Research:** The FY07 budget requests \$1.7 billion for the interagency Climate Change Science Program (CCSP), about the same level as enacted in FY06. There is an \$18 million (2 percent) decrease in NASA's contribution to CCSP, offset primarily by a \$23 million (14 percent) increase in NOAA and a \$5 million (4 percent) decrease in DOE's contributions to the program. The request for CCSP includes \$200 million for the interagency Climate Change Research Initiative (CCRI), about the same level as enacted in FY06. CCRI is intended to target critical scientific uncertainties and deliver results in three to five years.

**The National Earthquake Hazard Reduction Program (NEHRP):** NEHRP is an interagency effort aimed at reducing earthquake hazards through activities such as seismic and engineering research, earthquake monitoring, and code development and adoption. It includes NIST, NSF, the U.S. Geological Survey (USGS), and the Federal Emergency Management Agency (FEMA). While the complete NEHRP budget for FY07 is not currently available, NIST requests \$1.7 million (up \$0.8 million), NSF requests \$54.7 million (up \$1.0 million), and USGS requests \$55.4 million (up \$1.6 million) for earthquake activities. Included in the USGS NEHRP budget is \$8.1 million for the Advanced National Seismic System (ANSS). The FEMA request is not available.<sup>8</sup> NIST is the lead agency for NEHRP and it is funded at about \$10 million below the authorized level.

**The National Windstorm Impact Reduction Program (NWIRP):** NWIRP, authorized in October 2004, is an interagency effort to improve scientific understanding of wind hazards and developing cost-effective measures to reduce their impact on lives and property through atmospheric research, code development, and creation of risk assessment tools. The participating agencies include NSF, NIST, FEMA, and NOAA. While a plan for program implementation was due to Congress in October 2005, it has not yet been received, and proposed spending levels for this program in FY07 have not been provided to the Committee. The

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<sup>6</sup> For FY07, NSF cybersecurity programs are authorized at \$142 million and NIST cybersecurity programs are authorized at \$92 million.

<sup>7</sup> DHS also supports operational cybersecurity programs, such as tracking computer and network vulnerabilities and coordinating the monitoring of government networks for cyberincidents. Located in the National Cyber Security Division of the DHS Preparedness Directorate, operational cybersecurity receives \$92 million in FY07, the same as in FY06.

<sup>8</sup> The NEHRP agencies are authorized to receive a total of \$160.55 million in FY07, including \$12.10 million for NIST, \$40.31 million for NSF, \$22.28 million for FEMA, and \$85.86 million for USGS (of which \$36 million is designated for the ANSS).

authorized appropriations for FY07 total \$25 million—\$9.4 million for FEMA, \$9.4 million for NSF, \$4 million for NIST, and \$2.2 million for NOAA.

## **7. Agency R&D Highlights**

### **Department of Energy (DOE)**

The FY07 request for civilian R&D at DOE of \$6.3 billion represents an increase of 9 percent<sup>9</sup> from FY06 enacted levels. The Administration's top funding priorities are the Office of Science and nuclear energy research focused on reprocessing of nuclear waste to reduce its toxicity, make more fuel available for future use, and reduce the volume of waste requiring disposal.

#### *Office of Science*

As part of the *American Competitiveness Initiative*, the budget requests \$4.1 billion for the Office of Science, an increase of \$505 million or 14 percent. The budget seeks to strike a balance between support for researchers (45 percent) and the operation of national scientific user facilities (38 percent). Major increases in research support are provided for university-based nuclear physics (up 17 percent to \$64.5 million), the development of advanced computing software (up 51 percent to \$50 million) and research at the nanoscale (up 62 percent to \$158 million). Office of Science funding for the President's Hydrogen Fuel Initiative increases 54 percent to \$50 million.

Funding requested for facility operations allows the Office of Science to operate its suite of scientific user facilities at 96 percent of the optimal number of operating hours, compared to 88 percent in FY06. The request also allows DOE to bring into full operation the new Spallation Neutron Source and four of five new Nanoscale Science Research Centers. An additional \$20 million is provided for project engineering and design for the National Synchrotron Light Source II project at Brookhaven National Laboratory. In addition, resources are nearly doubled from \$54 million to \$102 million to acquire and upgrade the leadership computing facilities at Oak Ridge National Laboratory and Argonne National Laboratory.

The budget requests neither R&D nor construction funding explicitly for the Rare Isotope Accelerator (RIA), a nuclear physics facility accorded relatively high priority in the Office of Science's 20-year facilities plan. The budget does request \$4 million to continue exotic beam R&D, which are the capabilities RIA or a RIA-like machine would deliver.

The request includes \$60 million for FY07 in the Fusion program for ITER, an international partnership to build a large-scale fusion reactor. A significant fraction of that \$60 million is a research effort at domestic fusion facilities in support of the ITER program. Direct ITER project costs are slated to increase only \$21 million, while the Fusion program overall increases \$31 million. The request provides fusion facilities with 51 percent of optimal operating hours.

The request for Biological and Environmental Research (BER) program is the only major program area in the Office of Science with a cut: the requested budget declines \$70 million, or

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<sup>9</sup> These figures do not include a proposed cancellation of balances in the dormant Clean Coal Technology account.



12 percent. However, the request for BER rises to \$510 million, a \$59 million (13 percent) increase after deducting \$130 million of FY06 Congressional earmark. Within BER, climate change research is reduced \$6.6 million, including reductions to ocean carbon sequestration research (down \$4.9 million) and climate modeling (down \$1.5 million).

### *Applied Energy Programs*

The FY07 request for applied energy programs reflects a series of trade-offs to accommodate the *Advanced Energy Initiative*. Overall, in ongoing accounts,<sup>10</sup> the budget for applied energy programs increases 1 percent or \$17 million, from \$2.14 billion to \$2.16 billion. The Nuclear Energy program shows the largest increases, the Energy Efficiency and Renewable Energy program is flat, and the Fossil Energy and Electricity Distribution and Energy Reliability programs both are proposed for funding reductions.

In the Office of Nuclear Energy, after some accounting changes in infrastructure are included, total funding for programs in the jurisdiction of the Science Committee increases \$95 million, or 21 percent to \$554 million. The biggest funding increase occurs in the Advanced Fuel Cycle Initiative (AFCI), which is tripled from \$79 million to \$243 million. AFCI is the program to develop fuel reprocessing and recycling technology, and therefore a key component of the Global Nuclear Energy Partnership (see below). Conversely, university support, previously funded at \$27 million, is terminated; Generation IV is down by \$23 million (down 42 percent to \$31 million), including a \$16.6 million cut to the Next Generation Nuclear Plant. Nuclear hydrogen R&D also is cut by \$6 million (down 25 percent to \$19 million). The Nuclear Energy office is now responsible for all of Idaho facilities management, which is cut by \$4 million (down 4 percent to \$95.3 million). Radiological facilities management is cut \$4.3 million (down 8 percent to \$50 million).

DOE also announced the creation of the Global Nuclear Energy Partnership (GNEP), a program to promote the use of nuclear power worldwide. The program would manage nuclear fuel through international agreements as a strategy to reduce proliferation risks. GNEP also will include a domestic nuclear fuel reprocessing and recycling component to reduce the need for additional long-term waste storage capacity. While the GNEP activities will be carried out in various programs throughout DOE, the major new funding effort is directed toward accelerating activities in AFCI.

There are major shifts in the Office of Energy Efficiency and Renewable Energy (EERE), which overall sees an increase of 0.2 percent (up \$3 million to \$1,176 million). However, R&D programs are up \$81 million (up 9 percent to \$1,012 million.) Reflecting new initiatives announced in the State of the Union address, Solar Energy programs are slated for a \$65 million increase (up 78 percent to \$148 million), Biomass programs would increase \$58 million (up 65 percent to \$150 million), Hydrogen programs would increase \$40 million (up 26 percent to \$196 million), and Wind programs would increase \$5 million (up 13 percent to \$44 million).

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<sup>10</sup> The budget proposes to rescind \$203 balances in the old Clean Coal Technology account. The statutory authority for this account does not permit new project starts, but a similar demonstration program in the Fossil Energy R&D account has been active for several years.

The other item mentioned in the State of the Union, battery research for plug-in hybrids, standard hybrids, and fuel cell vehicles, increases \$6.2 million (up 427 percent to \$7.6 million), but overall funding for Vehicle research is slated to decrease.

On the Energy Efficiency side, research programs face a proposed total decrease of \$36 million (down 11 percent to \$289 million). In the largest single cut in EERE, weatherization grants are cut \$78 million (down 32 percent to \$164 million). This program is not an R&D program, but improves energy efficiency in low-income homes; the reduction will amount to about 30,000 fewer homes being weatherized in FY07. The Vehicles budget is proposed to be cut \$23 million (down 12 percent to \$166 million); the Buildings budget is proposed to be cut \$2 million (down 2 percent to \$77 million); and the Industries budget is proposed to be cut \$11 million (down 20 percent to \$46 million).

Looking at subaccounts, the largest reduction in Vehicles R&D is to earmarked projects; Materials Technology is proposed to be reduced and as is much of the work on Heavy Vehicles throughout the program. In Buildings, there is a proposed \$4 million increase in Building America (program with a goal to achieve zero energy homes by 2020) and a proposed \$1.2 million increase to commercial buildings R&D; decreases come from a cancellation of earmarks and some redistribution of other funds.

In the Office of Fossil Energy, the R&D account is proposed to be cut \$122 million from FY06 levels (down 21 percent to \$470 million) with the majority of the savings from the proposed termination of the Natural Gas Technology and Oil Technology programs (\$33 million and \$32 million in FY06 respectively). An additional \$44 million reduction (down 90 percent to \$5 million) is proposed in funding for the Clean Coal Power demonstration program. DOE has explained this reduction by noting that there is over \$500 million allocated to the program in prior years, most of which has not yet been spent. This reduction is characterized as temporary, “so that the program can take steps to improve the use of funds already provided for projects.” In addition to the cancellation of the Oil and Gas technology programs, the budget proposes to repeal the Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research program through a future legislative proposal, consistent with the decision to terminate the discretionary Oil and Gas programs. This program was passed as part of the *Energy Policy Act of 2005*; the proposal would result in the rescission of a projected \$50 million in mandatory funding.

The Office of Electricity Delivery and Energy Reliability was again substantially reorganized and then cut \$37 million (down 23 percent to \$125 million) with the R&D programs taking the lion’s share of the cuts, down \$40 million (down 30 percent to \$96 million). These programs include superconductivity research, power grid reliability and research on distributed energy systems.

**Table 1.**

**Department of Energy Civilian R&D (1)**  
FY 2007 Budget Request (dollars in millions)

<b>Account</b>	<b>FY05 Enacted</b>	<b>FY06 Request</b>	<b>FY06 Approps</b>	<b>FY07 Request</b>	<b>FY06- 07 change</b>	<b>FY 06- 07 percent</b>
<b>Science</b>	3,646	3,464	3,602	4,107	505	14%
High Energy Physics	723	714	717	775	58	8%
Nuclear Physics	394	371	367	454	87	24%
Bio and Envr Research	566	456	580	510	-70	-12%
Basic Energy Sciences	1,084	1,146	1,135	1,421	286	25%
Adv Computing	226	207	235	319	84	36%
Fusion Energy Science	267	291	288	319	31	11%
Other (2)	386	279	282	309	27	10%
<b>Fossil Energy R&amp;D (3)</b>	561	491	592	470	-122	-21%
<b>Energy Effic. and Renewable (4)</b>	1012	975	931	1012	81	9%
<b>Nuclear Energy (5)</b>	454	408	458	554	95	21%
<b>Electric Delivery and Energy Reliability</b>	116	96	162	125	-37	-23%
<b>Applied Energy Programs</b>	2143	1970	2143	2161	17	1%
<b>Total</b>	5,789	5,434	5,745	6,268	522	9%

(1) Some columns may not add due to independent rounding.

(2) Other includes program direction, laboratories infrastructure, education, and other activities.

(3) R&D programs only - not including accounting changes for the Clean Coal Technology Account

(4) R&D programs only - not including weatherization

(5) Includes R&D and Infrastructure- prior years adjusted to match FY07 proposals

## **National Science Foundation (NSF)**

The National Science Foundation is the primary source of federal funding for non-medical basic research conducted at colleges and universities and serves as a catalyst for science, technology, engineering, and mathematics education reform at all levels. As previously mentioned, NSF is one of the research agencies that the President has proposed to double over the next 10 years as part of the *American Competitiveness Initiative*. The FY07 budget request for NSF, therefore, is \$6.02 billion, an increase of 7.9 percent, or \$439 million over the FY06 level.

The funding increase in the FY07 budget mainly goes to scientific research programs and research facilities and is spread fairly evenly among all fields NSF supports, including engineering, non-biomedical life sciences, physics, and geosciences. New programs begun with the increased research funding include \$50 million to begin the acquisition of a leadership-class high performance computer and \$20 million requested to support leading edge sensor and related research to help predict and detect explosives and related threats. Some of the new funding is allotted to the expansion of existing high-priority programs, such as a \$29 million increase for nanotechnology research and \$20 million increase for cybersecurity research. For research facilities, the account that funds construction of large user facilities increases by \$50 million, and NSF requests funding to begin building three new facilities.<sup>11</sup> Finally, the overall funding increase allows NSF to request \$50 million in additional funds for various research and education initiatives associated with the International Polar Year, an international activity for which NSF is the lead U.S. agency.

As noted above, the FY07 budget requests an increase (2.5 percent) for the Education and Human Resources (EHR) Directorate, bringing the total funding to \$816 million. Additional funds are proposed for graduate education, human resource development (activities to broaden participation in STEM fields), and the new Discovery Research K-12 (DK-12) program, which will focus on the grand challenges in education, such as the development of quality math and science assessments and the translation of cutting edge research into classroom practice. K-12 and undergraduate education programs would be reduced.

In FY06, the responsibility for the costs of the icebreakers that support scientific research in the polar regions was transferred to NSF from the U.S. Coast Guard, and the budget request proposes that NSF continue in this role in FY07. The actual cost for services and ship maintenance will be negotiated with the Coast Guard, but the estimated cost is \$57 million for FY07 (a slight decrease from FY06); this money will all be transferred back to the Coast Guard. In addition, NSF plans to, as in FY06, purchase icebreaking services on the open market for an additional cost of roughly \$10 million.

NSF continues to receive high marks from the Office of Management and Budget for the quality of its management and the excellence of its programs. NSF is one of only three agencies (of the 26 evaluated) to be awarded at least four green lights on the Executive Branch Management Scorecard, which rates agencies with green, yellow and red lights in areas such as financial

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<sup>11</sup> Funding (\$81 million) is requested to start construction on Alaska Region Research Vessel (ARRV), Ocean Observatories Initiative (OOI), and National Ecological Observatory Network (NEON). (NSF has requested funding for NEON in past budgets, but no construction funding has been appropriated to date.)

management, e-government, and human capital management. In addition, ten NSF programs have been examined to date using the Program Assessment Rating Tool (PART),<sup>12</sup> and all ten programs received ratings of “effective,” the highest possible rating. NSF remains the only agency in the Federal government to receive the highest rating on every program that was “PART-ed.”

#### *Issues/Questions Raised by the FY07 Request for NSF*

### **Education and Human Resource (EHR) Directorate**

The increase (2.5 percent) for the EHR Directorate is not distributed evenly among the variety of education areas supported by NSF. In graduate education, increased funding will enable NSF to maintain its current stipend of \$30,000 for top graduate students and further broaden participation in these programs, and the proposed \$26 million increase for human resource development will provide expanded support for programs and activities that expand opportunities for traditionally underserved populations. The Math and Science Partnership (MSP) Program, envisioned as part of the President’s *No Child Left Behind Initiative* and enacted by the *NSF Authorization Act of 2002*, continues to decline, from \$140 million in FY04 to \$46 million in FY07. Without additional resources, the amount proposed will be used to fund existing grants only.

NSF reorganized the EHR Directorate in FY06, masking some additional downward funding trends. Specifically, while a notable increase (\$11 million) is proposed for a newly formed DK-12 program, the three K-12 programs<sup>13</sup> that were merged into DK-12 suffered significant cuts from FY05 to FY06. This year’s proposed increase does little to restore those reductions. In addition, research and evaluation activities<sup>14</sup> have declined each of the past two years and are down \$25 million overall. Finally, undergraduate education programs have also declined over the same period. While workforce development programs, such as the Advanced Technological Education, Noyce Scholarships, and STEP (a.k.a. Tech Talent), have grown slightly, capacity-building programs have fallen appreciably in the past two years—for example, the Curriculum, Course, and Laboratory Improvement program would decline by \$8 million between FY05 and FY07.

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<sup>12</sup> PART is described by the budget as a tool “developed to assess and improve program performance so that the Federal government can achieve better results. A PART review helps identify a program’s strengths and weaknesses to inform funding and management decisions aimed at making the program more effective.”

<sup>13</sup> The Instructional Materials Development Program, the Teacher Professional Continuum Program, and the Centers for Learning and Teaching Program were combined to form the new Discovery Research K-12 (DK-12) Program in FY06.

<sup>14</sup> “Research and evaluation activities” refer to the Research, Evaluation and Communication Program (REC), which was renamed the Research and Evaluation on Education in Science and Engineering (REESE) and shifted from a stand-alone program into the new Division of Research on Learning in Formal and Informal Settings (DRL).

**Table 2.**

**National Science Foundation**  
FY 2007 Budget Request (dollars in millions)  
(Source: Agency Budget Justification)

Account	FY05 Actual	FY06 Current Plan	FY07 Request	Change FY06 to FY07	
				Amount	Percent
RRA	4235	4331	4666	334	7.7%
BIO	577	577	608	31	5.4%
CISE	490	496	527	30	6.1%
ENG	577	581	629	48	8.2%
GEO	697	703	745	42	6.0%
MPS	1069	1085	1150	65	6.0%
SBE	197	200	214	14	6.9%
OCI	123	127	182	55	43.5%
OISE	43	35	41	6	17.6%
OPP	350	391	440	49	12.6%
IA	131	137	131	-6	-4.2%
EHR	844	797	816	20	2.5%
MREFC	165	191	240	50	26.0%
S&E	223	247	282	35	14.2%
OIG	10	11	12	1	4.4%
NSB	4	4	4	0	-1.0%
<b>Total</b>	<b>5481</b>	<b>5581</b>	<b>6020</b>	<b>439</b>	<b>7.9%</b>

Acronyms:

RRA = Research and Related Activities

EHR = Education and Human Resources

MREFC = Major Research Equipment and Facilities Construction

S&E = Salaries & Expenses

OIG = Office of Inspector General

NSB = National Science Board

BIO = Biological Sciences

CISE = Computer & Information Science & Engineering

ENG = Engineering

GEO = Geosciences

MPS = Mathematical and Physical Sciences

SBE = Social, Behavioral, and Economic Sciences

OCI = Office of Cyberinfrastructure

OISE = Office of International Science and Engineering

OPP = Office of Polar Programs

IA = Integrative Activities

Table 3.

### NSF Education and Human Resources Directorate

FY 2007 Budget Request (dollars in millions)

(Source: Agency budget justification)

Account	FY05 Actual (Prior to Restructuring)	New Organizational Structure	FY06 Current Plan, based on New Structure	FY07 Request	\$ Change (FY06 – FY07)	% Change (FY06 – FY07)
<b>EISE</b>	<b>182</b>	<b>DRL</b>	<b>215.2</b>	<b>215</b>	<b>-0.2</b>	<b>-0.1%</b>
IMD	29	DK-12 (combination of IMD, TPC, CLT)	93	104	11	11.8%
TPC	61					
CLT	26					
ISE	63	ISE	63	66	3	4.7%
		REESE (formerly REC and a separate line item)	48	41	-7	-14.5%
<b>REC</b>	<b>66</b>	(renamed REESE, transferred to DRL)				
<b>DUE</b>	<b>154</b>	<b>DUE</b>	<b>212</b>	<b>197</b>	<b>-15</b>	<b>-7.0%</b>
Tech Talent	25	Tech Talent	25.5	26	0.5	2.0%
CCLI	94	CCLI	88	86	-2	-1.8%
Noyce	8	Noyce	9	10	1	11.4%
		MSP (formerly a separate line item)	63	46	-17	-27.2%
<b>MSP</b>	<b>79</b>	(transferred to DUE)				
<b>DGE</b>	<b>155</b>	<b>DGE</b>	<b>153</b>	<b>161</b>	<b>8</b>	<b>4.9%</b>
<b>HRD</b>	<b>119</b>	<b>HRD</b>	<b>118</b>	<b>144</b>	<b>26</b>	<b>21.8%</b>
<b>EPSCOR</b>	<b>93</b>	<b>EPSCOR</b>	<b>99</b>	<b>100</b>	<b>1</b>	<b>1.3%</b>
<b>TOTAL</b>	<b>844</b>	<b>Total</b>	<b>797</b>	<b>816</b>	<b>19</b>	<b>2.5%</b>

\*Not a complete list of education programs. **Bold** distinguishes separate budgetary line items.

Acronyms:

EISE – Division of Elementary, Secondary and Informal Education

DRL – Division of Research on Learning in Formal and Informal Settings (the old EISE, with REC added)

IMD – Instructional Materials Development Program

TPC – Teacher Professional Continuum Program

CLT – Centers for Learning and Teaching Program

DR-K12 – Discovery Research K-12 Program

ISE – Informal Science Education Program

REC – Research, Evaluation and Communication

REESE – Research and Evaluation on Education in Science and Engineering (the old REC) Program

DUE – Division of Undergraduate Education

CCLI – Course, Curriculum and Laboratory Improvement Program

MSP – Math and Science Partnership Program

DGE – Division of Graduate Education

HRD – Division of Human Resource Development

EPSCoR – Experimental Program to Stimulate Competitive Research

## **Homeland Security R&D**

### *Homeland Security R&D at the Department of Homeland Security (DHS)*

The vast majority of R&D at DHS is funded by the Science and Technology (S&T) directorate. Proposed funding for S&T is \$1.0 billion, a decrease of \$485 million (33 percent) below the FY06 enacted level. This decrease reflects the transfer of almost all nuclear and radiological programs to the Domestic Nuclear Detection Office (DNDO), which reports directly to the Secretary. In addition, the program to develop countermeasures to shoulder-fired anti-aircraft missiles will be concluding in FY07. Accounting for these changes, the FY07 request is a \$47 million reduction (4.5 percent) from FY06.

S&T directorate funding is split among various technical portfolio areas, such as biological countermeasures, standards, critical infrastructure protection, and support of DHS component agencies (such as Customs and Border Protection and the U.S. Secret Service). A complete list of portfolios and their funding is provided in Table 4.

Within the relatively flat budget, a few new initiatives are proposed. An additional \$8.3 million is proposed for cybersecurity R&D for Internet security projects, cybersecurity testbeds and datasets, and research on identity management. Also, a Joint Agro-Terror Defense Office will be created within the Biological Countermeasures portfolio to enhance the interagency coordination of advanced development of agro-defense countermeasures.

A number of portfolios will receive significant decreases. Of greatest concern is the 23 percent decrease in the Standards portfolio, which is responsible for activities that include coordinating the development of metrics for equipment performance and certification, protocols for testing and training, and evaluation of equipment. This decrease will hamper DHS's ability to provide standards and guidelines for existing commercial technologies as well as for novel products being developed by other DHS programs. Another area being cut deeply is the Emergent and Prototypical Technologies portfolio, a combination of basic research on emerging threats and rapid prototyping of new technologies. The \$18 million (41 percent) decrease in this portfolio will limit DHS's ability to tackle potential threats outside the existing portfolios, perform basic research for vulnerability characterization and countermeasure identification, and quickly address DHS-specific requirements for technologies.

Despite the decrease in funding for the DHS S&T directorate, the overall funding devoted to R&D at DHS does not drop appreciably, as a substantial increase is requested for DNDO (up \$221 million). DNDO now includes all the radiological and nuclear countermeasures activities formerly within DHS S&T, including development and evaluation of detection equipment and forensics, attribution, and standards programs. Of the \$536 million requested for DNDO for FY07, \$103 million (\$46 million above the FY06 level) is for transformational research and development projects to be conducted at universities and national laboratories and in industry.



### *Homeland Security R&D at Other Agencies*

Approximately \$3.4 billion is proposed for homeland security R&D programs in departments and agencies outside of DHS (Table 10). The bulk of this funding, \$1.8 billion (up 6.3 percent from FY06), is for bio-defense programs at NIH, such as basic research on infectious microbial agents, applied research on diagnostics, vaccines, and therapeutics, and construction of bio-containment facilities. The remaining funds (approximately \$1.7 billion) go to a number of other agencies, such as: EPA, which has been sharply increasing its funding for research on detection of chemical and biological agents in the water supply, microbial risk assessment and environmental decontamination; NSF, for research related to critical infrastructure protection, microbial genomics, and a new program for sensor technologies; the U.S. Department of Agriculture (USDA), for research on animal disease diagnostics and vaccines; DOD for detection systems, protective gear, and medical countermeasures for biological and chemical agents; and DOE's National Nuclear Security Administration for research on detection and attribution of radiological and nuclear materials.

In addition to individual agency programs, a number of cooperative efforts between DHS and other agencies exist: NSF and DHS jointly fund a cybersecurity testbed; DHS provides funding to NIST for standards work in a number of areas, such as standards for radiation detectors; and EPA and DHS co-fund a university center on microbial risk assessment.

### *Issues/Questions Raised by the FY07 Request for DHS*

**Balance of DHS S&T Programs:** Most of the work of the S&T directorate is heavily weighted toward development. Relatively little goes to fund longer-term, more basic research. As a result, relatively little of the funding is available to universities, although DHS S&T does fund several university centers. Whether this shorter-range focus is optimal for U.S. long-term security has been a matter of debate.

**Priorities across Threat Areas:** DHS S&T has to balance research priorities across a wide range of different kinds of threats—from cyberattacks to dirty bombs to foot and mouth disease—as well as supporting technology adoption in a wide variety of environments, including new interoperable communications systems for first responders and stand-alone laboratories that can safely receive and identify unknown hazardous substances. Yet for the first time since DHS was formed in FY03, funding for the S&T directorate has decreased. In these circumstances, robust risk assessment methodologies both within and across portfolios are needed.

**Table 4.****Department of Homeland Security Science and Technology Directorate**

FY 2007 Budget Request (dollars in millions)

(Source: Agency Budget Justification)

<b>Account</b>	<b>FY05 Actual</b>	<b>FY06 Appropri.</b>	<b>FY07 Req.*</b>	<b>Amount Change</b>	<b>Percent Change</b>
Biological Countermeasures (including NBACC and PIADC)	452	376	386	10	2.6%
Nuclear & Radiological Countermeasures	131	19	0	-19	-100.0%
Domestic Nuclear Detection Office (DNDO)		315	0	-315	-100.0%
Chemical Countermeasures	61	94	95	1	1.3%
Explosives Countermeasures	19	44	92	49	111.7%
Threat Awareness (formerly TVTA)	84	43	45	3	6.6%
Counter-MANPADS	52	109	5	-104	-95.5%
Support of DHS Components	52	79	99	20	24.8%
Transferred R&D Programs**	0	99	0	-99	-100.0%
Standards	40	35	27	-8	-23.2%
Rapid Prototyping Program	66	35	0	see EPT	
Emerging Threats	13	8	0	see EPT	
Emergent & Prototypical Technology (EPT)			25	-18	-41.4%
University Centers & Fellowship Programs	114	62	60	-2	-3.7%
Cybersecurity	18	17	25	8	50.4%
Critical Infrastructure Protection	65	40	21	-20	-48.9%
Interoperability and Communications	7	26	33	7	26.3%
SAFETY Act Implementation	1	7	6	-1	-19.1%
Administration/Salaries	69	80	84	4	4.5%
<b>Total</b>	<b>1,244</b>	<b>1,487</b>	<b>1,002</b>	<b>-485</b>	<b>-32.6%</b>
<b>Total without DNDO, Nuclear &amp; Radiological Countermeasures, and Counter-MANPADS</b>		<b>1,044</b>	<b>997</b>	<b>-47</b>	<b>-4.5%</b>

\*The FY07 Request removes Management and Administration funds from each account to create a more accurate picture of the centralized Administration/Salaries line item going forward. However, for the purposes of comparison to FY06, the removed Management and Administration funds have been added back into each portfolio in this table.

\*\*The R&D programs transferred into DHS S&T from elsewhere in DHS in FY06 are mainly from the Transportation Security Administration, and these funds have been redistributed to the Explosives Countermeasures Portfolio and the Support of DHS Conventional Missions.

Note: The request for DHS S&T presents proposed and past funding levels by technical topic, not by organizational unit or research performer. At this time, DHS is not able to provide information on how funds will be distributed among research performers (e.g. the private sector, national laboratories, and universities) in FY06 or FY07 or how they were distributed in FY05.

## Acronyms:

DNDO = Domestic Nuclear Detection Office

NBACC = National Biodefense Analysis and Countermeasures Center

PIADC = Plum Island Animal Disease Center

MANPADS = Man Portable Air Defense Systems

## **National Institute of Standards and Technology (NIST)**

### *NIST's Laboratory Programs*

The FY07 budget requests \$467 million for a wide range of research conducted at NIST laboratories in Gaithersburg, Maryland, and Boulder, Colorado. The request is \$67 million (17 percent) above the FY06 enacted level of \$399 million and is \$41 million above the FY06 request. The request also includes \$68 million for construction and renovation of NIST's scientific facilities.

The increase in laboratory programs for FY07 comprises 12 initiatives that span a range of scientific and engineering disciplines. Two of the initiatives are major upgrades and enhancements of NIST national research facilities: the NIST Center for Neutron Research (NCNR) and the Center for Nanoscale Research and Technology (CNRT, located within NIST's Advanced Measurements Laboratory). One initiative is to expand NIST's existing presence at the National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory. The other nine initiatives are increases to NIST laboratory and technical programs that are directed at solving measurement and other technical problems in energy, medical technology, manufacturing, homeland security, and public safety.

### *Issues/Questions Raised by the FY07 Request for NIST*

**Impact of Proposed Elimination of the Advanced Technology Program (ATP):** The FY07 budget request proposes to eliminate ATP (funded at \$80 million in FY06). Moreover, ATP funded an estimated \$8 million worth of R&D conducted at the NIST laboratories in FY06. Therefore, the proposal to end ATP could result in a reduction in research funding to the NIST laboratories, eating up a portion of the proposed increase under the *American Competitiveness Initiative*.

**Impact of Scaling Back the Manufacturing Extension Partnership (MEP) Program:** The FY07 request for MEP is \$46.3 million, which represents a 56 percent cut from the FY06 enacted level of \$106 million. At this level, it is unclear how the MEP program would function as a national network.

Table 5.

**National Institute of Standards and Technology**  
FY 2007 Budget Request (budget in millions)  
(Source: Agency Budget Justification)

Account	FY 2005 Enacted	FY 2006 Enacted	FY 2007 Request	Amount Change	Percent Change
<b>Laboratories</b>					
EEE	48.9	50.1	50.9	0.8	1.5%
ME	23.5	22.1	24.5	2.3	10.5%
CST	43.4	44.7	50.2	5.6	12.5%
Phys	41.2	42.1	62.5	20.4	48.4%
MSE	60.1	33.1	38.9	5.9	17.7%
BFR	21.5	22.0	24.4	2.4	10.7%
CSAM	62.9	64.6	69.7	5.1	7.9%
STS	15.4	16.0	18.3	2.4	15.2%
RS <sup>1</sup>	56.5	60.6	-	(60.6)	-
MS	-	-	20.0	20.0	
PD	-	-	10.9	10.9	
CS			6.8	6.8	
BS	-	-	12.1	12.1	
BQP	5.4	7.0	7.6	0.6	6.8%
<b>Facilities</b>					
CNR	0	-	38.5	38.7	--
N3F	0	37.4	31.6	(5.9)	(15.7%)
<b>Total, NIST Labs</b>	<b>378.7</b>	<b>399.9</b>	<b>467.0</b>	<b>67.5</b>	<b>17%</b>
<b>Construction<sup>2</sup></b>	<b>72.5</b>	<b>175.9</b>	<b>68.0</b>	<b>(107.9)</b>	<b>(61.3%)</b>
<b>ITS</b>					
ATP	140.4	80.0	0	(80.0)	(100.0%)
MEP	107.5	106.0	46.3	(59.6)	(56.3%)
<b>NIST TOTAL</b>	<b>699.1</b>	<b>761.8</b>	<b>581.3</b>	<b>(180.5)</b>	<b>(23.7%)</b>

<sup>1</sup>The \$60.1 million decrease in Research Support account is due to the institution of new budget lines (MS, PD, CS, and BS) and removal of earmarks.

<sup>2</sup> When \$127 million in earmarks are removed from the FY06 appropriation for the NIST construction account, the FY07 budget actually requests a 39 percent increase for NIST construction funds.

Acronyms:

EEE = Electronics and Electrical Engineering  
ME = Manufacturing Engineering  
CST = Chemical Science and Technology  
Phys = Physics  
MSE = Materials Science and Engineering  
BFR = Building and Fire Research  
CSAM = Computer Science and Applied Mathematics  
STS = Standards and Technology Services  
RS = Research Support  
MS = Measurement Services (new in FY07)

PD = Postdoctoral fellowships (new in FY07)  
CS = Computer support (new in FY07)  
BS = Business systems (new in FY07)  
BQP = Baldrige Quality Program  
CNR = Center for Neutron Research  
N3F = National Nanotechnology and Nanometrology Facility  
ITS = Industrial Technology Services  
ATP = Advanced Technology Program  
MEP = Manufacturing Extension Partnership

## **National Oceanic and Atmospheric Administration (NOAA)**

The FY07 budget requests \$3.7 billion for NOAA, a decrease of \$227 million (6 percent) compared to the FY06 enacted level of \$3.9 billion. However, NOAA's FY06 budget includes approximately \$600 million worth of earmarked projects. If these earmarks are removed from the FY06 baseline, then the President's budget could be construed as proposing an additional \$345 million (10 percent increase) for NOAA in FY07.

### *National Weather Service*

The FY07 budget requests \$882 million for the National Weather Service (NWS), an increase of \$33.6 million (4 percent). The increase includes \$29 million to develop, operate, and maintain a variety of warning and forecast systems such as the Tsunami Warning Program, the Air Quality Forecasting Program, and the Wind Profiler Network which improves tornado, severe storm, and flash flood forecasting.

### *Satellite Acquisition*

The FY07 budget requests \$1.03 billion for satellite programs at NOAA, an \$82 million (8.6 percent) increase over the FY06 enacted level of \$952 million. The proposed increase is for procurement and construction of the next generation of geostationary and polar weather satellites, and it is in line with the original budget plans for these satellite systems. In FY07, NOAA expects to let the prime contract for its next generation of geostationary satellites, "GOES-R." The geostationary satellites provide a constant watch for severe weather conditions such as tornadoes, flash floods, hail storms, and hurricanes, and they are important for short-term (between real-time and 2 days) weather forecasts. In contrast, NOAA's polar-weather satellites are essential for long-term (between 3 and 7 days) weather forecasts, tracking of severe weather, and climate observations.

### *Hurricane Research*

The FY07 budget includes requests for \$13 million for high performance computing (a 100 percent or \$6.5 million increase over FY06 enacted levels) and also includes \$2.5 million in new funds to accelerate hurricane research programs. Both requests will help NOAA improve its hurricane forecast models, in particular, its models of hurricane intensity.

### *Issues/Questions Raised by the FY07 Request for NOAA*

**Weather Satellite Program Management:** NOAA's next generation polar weather satellite program, National Polar-orbiting Operational Environmental Satellite System (NPOESS), is currently running as much as \$3 billion (more than 25 percent) over budget and as many as three years behind schedule. Since NPOESS is a joint NOAA- DOD program, this large cost increase triggered a review under the DOD's Nunn-McCurdy process. The review will finish in May or June. Currently, no increased funding is anticipated (or requested) in the FY07 budget as a result of the review, but increased funding will be required in future years. This could force NOAA to take resources away from other important missions at the agency.

Table 6.

### National Oceanic & Atmospheric Administration

FY 2007 Budget Request (dollars in millions)

(Source: Agency budget documents)

Account		FY05 Actual	FY06 Enacted	FY07 Request*	Amount Change	Percent Change
<b>National Ocean Service (NOS)</b>		<b>669</b>	<b>590</b>	<b>413</b>	<b>(177.3)</b>	<b>(30.0%)</b>
	ORF	541	493	394	(98.7)	(20.0%)
	PAC	127	91	13	(78.6)	(86.1%)
	Other	1	6	6	0.0	0.0%
<b>Oceanic and Atmospheric Research (OAR)</b>		<b>414</b>	<b>380</b>	<b>349</b>	<b>(30.9)</b>	<b>(8.2%)</b>
	ORF	404	370	338	(31.9)	(8.6%)
	PAC	10	9	10	1.0	10.8%
	Other	0	0	0	0.0	0.0%
<b>National Weather Service (NWS)</b>		<b>783</b>	<b>848</b>	<b>882</b>	<b>33.6</b>	<b>4.0%</b>
	ORF	704	747	783	36.7	4.9%
	PAC	79	101	98	(3.0)	(3.0%)
	Other	0	0	0	0.0	0.0%
<b>National Environmental Satellite, Data, and Information Service (NESDIS)</b>		<b>907</b>	<b>952</b>	<b>1,034</b>	<b>81.6</b>	<b>8.6%</b>
	ORF	176	178	150	(28.1)	(15.8%)
	PAC	731	774	884	109.8	14.2%
	Other	0	0	0	0.0	0.0%
<b>Program Support</b>		<b>449</b>	<b>491</b>	<b>406</b>	<b>(84.8)</b>	<b>(17.2%)</b>
	ORF	368	358	364	5.8	1.6%
	PAC	64	113	21	(91.8)	(81.6%)
	Other	18	20	21	1.2	6.1%
<b>National Marine Fisheries Service</b>		<b>824</b>	<b>804</b>	<b>737</b>	<b>(66.9)</b>	<b>(8.3%)</b>
<b>Other/Transfers</b>		<b>(128)</b>	<b>(117)</b>	<b>(136)</b>	<b>-----</b>	<b>-----</b>
<b>Total</b>		<b>3,918</b>	<b>3,948</b>	<b>3,684</b>	<b>(244.4)</b>	<b>(6.1%)</b>

\*NOAA removes earmarks from its budget request each year. Earmarks from FY06 in each of the line offices were NOS, \$221 million; OAR, \$73 million; NWS, \$16 million; NESDIS, \$39 million; Program Support, \$93 million; and NMFS, \$130 million.

Acronyms:

ORF = Operations, Research and Facilities

PAC = Procurement, Acquisition and Construction

## **8. Witnesses Questions**

All of the witnesses have been asked to:

1. Review the R&D budget request in the context of the Administration's overall priorities in science and technology.
2. Describe the mechanisms that the Administration uses to determine priorities across scientific disciplines.
3. Describe the mechanisms the Administration uses to coordinate its scientific research and technical development activities with other Federal agencies.

In addition, Dr. Bodman has been asked to:

1. Describe how the budget request will contribute to the development of climate change technologies.

## APPENDIX I: Budget Tables for Selected Interagency Programs.

**Table 7.**

### National Nanotechnology Initiative

(Dollars in Millions)

	FY05 Actual	FY06 Estim.	FY07 Proposed	Change FY06-07	
				Amount	Percent
<b>NSF</b>	335	344	373	29	8.4%
<b>Defense</b>	352	436	345	-91	-20.9%
<b>Energy</b>	208	207	258	51	24.6%
<b>NIST</b>	79	76	86	10	13.2%
<b>NASA</b>	45	50	25	-25	-50.0%
<b>NIH</b>	165	172	170	-2	-1.2%
<b>NIOSH</b>	3	3	3	0	0.0%
<b>EPA</b>	7	5	9	4	80.0%
<b>DHS</b>	1	2	2	0	0.0%
<b>USDA</b>	3	5	5	0	0.0%
<b>Justice</b>	2	1	1	0	0.0%
<b>Total</b>	1200	1301	1277	-24	-1.8%

(Source: Federal budget analytical perspectives, page 52,  
with updates provided by Office of Management and Budget)

#### Acronyms

NIH = National Institutes of Health

NIOSH = National Institute for Occupational Safety and Health

USDA = U.S. Department of Agriculture

**Table 8.**

### Networking and Information Technology R&D

(dollars in millions)

	FY06 Estim.	FY07 Proposed	Change FY06-07	
			Amount	Percent
<b>Defense</b>	1053	<b>1081</b>	29	2.7%
<b>NSF</b>	810	<b>904</b>	93	11.5%
<b>HHS</b>	562	<b>548</b>	-14	-2.5%
<b>Energy*</b>	291	<b>387</b>	95	32.8%
<b>NIST</b>	39	<b>43</b>	4	10.3%
<b>NOAA</b>	16	<b>23</b>	8	47.5%
<b>NASA</b>	78	<b>82</b>	4	5.0%
<b>EPA</b>	6	<b>6</b>	0	0.0%
<b>Total</b>	2855	<b>3074</b>	219	7.7%

(Source: Supplement to the Budget: Guide to the NITRD Program FY06-FY07)

Note: Comparable FY05 Actuals are not available, as this year improved accounting methods were used to more accurately reflect ongoing IT R&D programs, such as including cybersecurity research activities and projects underway in the Defense Services (Air Force, Army, Navy).

\* Department of Energy numbers include the DOE Office of Science and the DOE National Nuclear Security Administration.

#### Acronyms

HHS = Department of Health and Human Services



## APPENDIX I: Budget Tables for Selected Interagency Programs. (Continued)

Table 9.

### Climate Change Science Program

(dollars in millions)

	FY05 Actual	FY06 Estimate	FY07 Request	Change FY06-07	
				Amount	Percent
<b>NSF</b>	198	197	<b>205</b>	8	4.1%
<b>Energy</b>	127	131	<b>126</b>	-5	-3.8%
<b>Commerce</b>	124	163	<b>186</b>	23	14.1%
<b>EPA</b>	20	19	<b>17</b>	-2	-10.5%
<b>NASA</b>	1237	1043	<b>1025</b>	-18	-1.7%
<b>Total</b>	1706	1553	<b>1559</b>	6	0.4%

(Source: Federal budget analytical perspectives, page 52)

Table 10.

### Homeland Security R&D

(dollars in millions)

	FY05 Actual	FY06 Actual	FY07 Request	Change FY06-07	
				Amount	Percent
<b>HHS</b>	1,608	1,673	<b>1,779</b>	106	6.3%
<b>DHS</b>	1,017	1,482	<b>1,387</b>	-95	-6.4%
<b>Defense</b>	884	1073	<b>959</b>	-114	-10.6%
<b>NSF</b>	324	328	<b>370</b>	42	12.8%
<b>Justice</b>	61	58	<b>81</b>	23	39.7%
<b>USDA</b>	31	37	<b>79</b>	42	113.5%
<b>Commerce</b>	57	61	<b>67</b>	6	9.8%
<b>Energy</b>	32	52	<b>52</b>	0	0.0%
<b>EPA</b>	25	32	<b>40</b>	8	25.0%
<b>Treasury</b>	3	3	<b>3</b>	0	0.0%
<b>Transportation</b>	35	30	<b>26</b>	-4	-13.3%
<b>Total</b>	4,079	4,828	<b>4,843</b>	526	10.9%

(Source: Office of Management and Budget)

## APPENDIX II:

### Federal R&D Spending (adapted from FY07 Budget Request)\*

By Agency	2005 Actual	2006 Estimate	2007 Proposed	\$ Change 06-07	% Change 06-07
Defense	69,743	71,946	74,234	2,288	3%
Health and Human Services	28,687	28,767	28,737	-30	0%
NASA	10,197	11,394	12,245	851	7%
Energy	8,596	8,563	9,158	595	7%
National Science Foundation	4,138	4,199	4,548	349	8%
Agriculture	2,410	2,411	2,012	-399	-17%
Homeland Security	1,182	1,484	1,508	24	2%
Commerce	1,133	1,079	1,065	-14	-1%
Transportation	549	704	557	-147	-21%
Veterans Affairs	742	765	765	0	0%
Interior	622	637	600	-37	-6%
Environmental Protection Agency	640	600	557	-43	-7%
Other	1,235	1,232	1,218	-14	-1%
<b>Total</b>	<b>129,874</b>	<b>133,781</b>	<b>137,204</b>	<b>3,423</b>	<b>3%</b>
<b>Basic Research</b>					
Defense	1,485	1,470	1,422	-48	-3%
Health and Human Services	15,752	15,996	16,037	41	0%
NASA	2,386	2,305	2,226	-79	-3%
Energy	2,937	2,987	3,315	328	11%
National Science Foundation	3,427	3,478	3,687	209	6%
Agriculture	838	846	771	-75	-9%
Homeland Security	55	95	49	-46	-48%
Commerce	53	56	87	31	55%
Transportation	33	39	39	0	0%
Veterans Affairs	297	306	306	0	0%
Interior	36	42	40	-2	-5%
Environmental Protection Agency	110	101	94	-7	-7%
Other	155	169	174	5	3%
<b>Subtotal</b>	<b>27,564</b>	<b>27,890</b>	<b>28,247</b>	<b>357</b>	<b>1%</b>
<b>Applied Research</b>					
Defense	4,787	5,169	4,478	-691	-13%
Health and Human Services	12,573	12,605	12,540	-65	-1%
NASA	1,957	1,759	1,118	-641	-36%
Energy	2,770	2,730	2,723	-7	0%
National Science Foundation	332	319	379	60	19%
Agriculture	1,124	1,157	974	-183	-16%
Homeland Security	842	1,093	943	-150	-14%
Commerce	813	779	769	-10	-1%
Transportation	304	392	305	-87	-22%
Veterans Affairs	401	414	414	0	0%
Interior	533	545	510	-35	-6%
Environmental Protection Agency	415	387	359	-28	-7%
Other	587	591	594	3	1%
<b>Subtotal</b>	<b>27,438</b>	<b>27,940</b>	<b>26,106</b>	<b>-1,834</b>	<b>-7%</b>
<b>Development</b>					
Defense	63,336	65,221	68,315	3,094	5%
Health and Human Services	57	37	37	0	0%
NASA	3,494	5,174	6,755	1,581	31%
Energy	1,759	1,804	1,990	186	10%
National Science Foundation	N/A	N/A	N/A	N/A	N/A
Agriculture	156	164	155	-9	-5%
Homeland Security	133	195	335	140	72%
Commerce	148	118	94	-24	-20%
Transportation	194	255	194	-61	-24%
Veterans Affairs	44	45	45	0	0%
Interior	50	47	47	0	0%
Environmental Protection Agency	115	112	104	-8	-7%
Other	461	424	409	-15	-4%
<b>Subtotal</b>	<b>69,947</b>	<b>73,596</b>	<b>78,480</b>	<b>4,884</b>	<b>7%</b>

\*Agency totals also include the Facilities and Equipment category, which has not been itemized here.

Source: Analytical Perspectives, Budget of the United States Government, Fiscal Year 2007, pages 49-50.